CALIFORNIA COASTAL COMMISSION
45 FREMONT, SUITE 2000
SAN FRANCISCO, CA 94105- 2219
VOICE (415) 904- 5200
FAX (415) 904- 5400
TDD (415) 597-5885

CALIFORNIA COASTAL COMMISSION DRAFT SEA-LEVEL RISE POLICY GUIDANCE

Public Review Draft
Comment Period:
October 14, 2013 - January 15, 2014

Sunset Beach, Photo by Mario Fernandez

Chula Vista, Photo by Lisa Cox


San Francisco, Photo by Mike Baird


Arcata, Photo by Humboldt Baykeeper

REQUEST FOR COMMENTS

California Coastal Commission staff is now seeking comments on the Draft Sea-Level Rise Policy Guidance. The Draft Policy Guidance was released for public review on the Commission's website on October 14, 2013. Please send written comments on the Draft Policy Guidance via email or by U.S. mail to the address below.

California Coastal Commission
c/o Sea-level Rise Work Group
45 Fremont Street, Suite 2000
San Francisco, CA 94105
Email: SLRGuidanceDocument@coastal.ca.gov

Oral comments will be welcome at Commission public hearings in November, December, 2013 and/or January, 2014. Please check the Commission's website for updates on hearing dates.

Please send your comments as soon as possible and no later than **5 pm Wednesday, January 15, 2014.** The 90-day comment period is provided to maximize public, local government, and agency participation in the discussion and review of the Commission's Draft Sea-Level Rise Policy Guidance.

After the January 2014 Commission meeting and close of the written public comment period on January 15, 2014, Commission staff will address feedback from the Commission members, agencies, local governments, and the public and will prepare a proposed Final Sea-Level Rise Policy Guidance document. The Final Policy Guidance will be brought back to the Commission at a future public hearing.

Please email questions to **SLRGuidanceDocument@coastal.ca.gov** or call Hilary Papendick at (415) 904-5294 or Lesley Ewing at (415) 904-5291. Thank you in advance for your review and comments.

EXECUTIVE SUMMARY

Climate change is upon us, and almost every facet of California's natural and built environment is being affected. Increasing global temperatures are causing significant effects at global, regional, and local scales. In the past century, average global temperature has increased by about 0.8°C (1.4°F), and average global sea level has increased by 17 to 21 centimeters (7 to 8 inches) (IPCC, 2013). Sea level at the San Francisco tidal gauge has risen 20 centimeters (8 inches) over the past century, and the National Research Council projected that sea level may rise by as much as 140-165 centimeters (55-65 inches) in California by 2100 (NRC, 2012). The Coastal Commission has developed this guidance to help California's coastal communities prepare for the effects of sea-level rise.

The economic impacts of sea-level rise in California could be severe. Many parts of the state's $1.9 trillion economy – including coastal tourism, commercial fisheries, coastal agriculture, and ports – are at risk from sea-level rise. In addition to potential loses in revenue, the Pacific Institute estimates that $100 billion worth of property is at risk of flooding during a 100-year flood with a projected 1.4 meters of sea-level rise. This property includes seven wastewater treatment plants, commercial fishery facilities, marine terminals, Coastal Highway One, fourteen power plants, residential homes, and other important development and infrastructure (Heberger et al. 2009). Also, public beaches and recreational resources may be lost, and wetlands and other sensitive resources may disappear. These resources provide invaluable benefits to California, including recreation and tourism revenues, habitat for commercial fish species, enhanced water quality, and increased quality of life.

California must begin to take more proactive steps to address sea-level rise due to the significant impacts it may have on California's economy, natural systems, built environment, human health, and ultimately its way of life. This Sea-Level Rise Policy Guidance is intended to help local governments, permit applicants, and other interested parties begin to address the challenges presented by sea-level rise in California's coastal zone.

Specifically, this document provides step-by-step guidance on how to address sea-level rise in new and updated Local Coastal Programs (LCPs) and Coastal Development Permits (CDPs) according to the policies of the California Coastal Act. LCPs and the coastal development permit process are the fundamental land use planning and regulatory governing mechanisms in the coastal zone, and it is critically important that they are based in sound science and updated policy recommendations. This document also contains guiding principles for addressing sea-level rise in the coastal zone; a description of the best available science for California on sea-level rise; specific policy guidance to effectively address coastal hazards while continuing to protect coastal resources; and background information on adaptation measures, sea-level rise science, how to establish future local water conditions in light of sea-level rise, links to useful resources and documents from other state agencies, and Coastal Act policies relevant to sea-level rise.

This guidance document is also part of a larger statewide strategy to respond to climate change. California is working on a number of important initiatives to both reduce the state's contribution to global warming through the emission of greenhouse gases, and to reduce the impacts of a changing climate to California. This guidance is being coordinated closely with many of these

other initiatives, including the 2013 update to the 2009 California Adaptation Strategy (Safeguarding California Plan), 2013 update to the General Plan Guidelines, 2013 update to the California Office of Emergency Services' State Hazard Mitigation Plan and a number of other plans and programs that also affect land use development patterns and the reduction of long-term risk exposure to coastal hazards.[1] It is important these various state efforts are closely coordinated and avoid unnecessary conflict, to assure an effective statewide response to challenges such as sea-level rise. The Commission has been and will continue to participate in the coast and ocean group of a multi-state agency climate action team first established in 2008. The Commission also will continue to coordinate with other on-going state initiatives through the public review and adoption process for this guidance, to assure that the Commission's efforts to respond to sea level rise work in concert with the larger state strategy.

USING BEST AVAILABLE SCIENCE ON SEA-LEVEL RISE

California must use the best available environmental science to conduct coastal land use planning and development. The State of California supported the preparation of the 2012 National Research Council's Report, *Sea Level Rise for the Coasts of California, Oregon and Washington: Past Present and Future*, which is currently considered the best available science on sea-level rise for California. The report contains sea-level rise projections for three time periods over the coming century for north and south of Cape Mendocino (Table 1).[2] In March 2013, the State of California Sea-level Rise Guidance Document prepared by the Ocean Protection Council was updated to include the following sea-level rise projections from the NRC report.[3]

[1] See the Governor's Office of Planning and Research's webpage for a matrix of additional efforts. Available at: http://opr.ca.gov/s_publications.php

[2] The NRC Committee divided the Pacific coast for California, Oregon and Washington into two regions, north and south of Cape Mendocino, due to differences in tectonics that occur at this point. North of Cape Mendocino, land is rising by 1.5 to 3.0 mm/yr as ocean plates descend below the North American plate at the Cascadia Subduction Zone. South of Cape Mendocino, the coast is sinking at an average rate of about 1 mm/yr, although local rates vary widely (NRC 2012, pg 3). Humboldt Bay has not experienced the regional uplift that characterizes most of the coast north of Cape Mendocino, and instead has shown the highest subsidence recorded for the California coast. As a result, the projections for north of Cape Mendocino may not be appropriate for use in or near Humboldt Bay and the Eel River Estuary.

[3] Any future updates to the state guidance document will be available at http://www.opc.ca.gov/2009/12/climate-change/.

Table 1. NRC Sea-Level Rise Projections for California (NRC, 2012)

TIME PERIOD	NORTH OF CAPE MENDOCINO	SOUTH OF CAPE MENDOCINO
2000 – 2030	-4 – +23 cm (-1.56 – 9 inches)	4 – 30 cm (1.56 – 11.76 inches)
2000 – 2050	-3 – + 48 cm (-1.2 – 18.84 inches)	12 – 61 cm (4.68 – 24 inches)
2000 – 2100	10 – 143 cm (3.6 – 56.28 inches)	42 – 167 cm (16.56 – 65.76 inches)

In addition to these sea-level rise projections, the 2012 NRC report provides information on the impacts of sea-level rise in California. According to the report, sea-level rise will cause flooding and inundation, an increase in coastal erosion, changes in sediment supply and movement, and saltwater intrusion to varying degrees along the California coast. These effects in turn could have a significant impact on the coastal economy and could put important coastal resources and coastal development at risk, including ports, marine terminals, commercial fishing infrastructure, public access, recreation, wetlands and other coastal habitats, water quality, biological productivity in coastal waters, coastal agriculture, and archeological and paleontological resources.

PRINCIPLES FOR ADDRESSING SEA-LEVEL RISE IN THE COASTAL ZONE

This guidance is rooted in certain fundamental guiding principles, many of which derive directly from the requirements of the Coastal Act. In this respect, the principles are not new, but rather generally reflect the policies and practices of the Commission since its inception in addressing coastal hazards and the other resource and development policies of the Act. Each of the four groups of principles below embodies important concepts that are specifically and increasingly raised by the challenges of rising sea levels. This guidance builds on the cumulative knowledge and experience of the agency to help identify practical guidance for addressing sea-level rise in the California coastal zone, consistent with these principles and the statewide policies of the California Coastal Act.

A. Use Science to Guide Decisions [Coastal Act Sections 30006.5; 30335.5]

1. Acknowledge and address sea-level rise as necessary in planning and permitting decisions.
2. Use the best available science to determine locally relevant (context-specific) sea-level rise projections for all stages of planning, project design, and permitting reviews.
3. Recognize scientific uncertainty by using scenario planning and adaptive management techniques.

B. Minimize Coastal Hazards through Planning and Development Standards [Coastal Act Sections 30253, 30235; 30001, 30001.5]

4. Avoid significant coastal hazard risks where feasible.
5. Minimize hazard risks to new development over the life of authorized structures.

6. Avoid or minimize coastal resource impacts when addressing risks to existing development.
7. Account for the social and economic needs of the people of the state; assure priority for coastal-dependent and coastal-related development over other development.
8. Property owners should assume the risks associated with new development in hazardous areas.

C. Maximize Protection of Public Access, Recreation, and Sensitive Coastal Resources [Coastal Act Chapter 3; Section 30235]

9. Provide for maximum protection of public beach and recreational resources in all coastal planning and regulatory decisions.
10. Maximize natural shoreline values and processes and embrace green infrastructure and living shorelines; avoid the perpetuation of shoreline armoring.
11. Address other potential coastal resource impacts (wetlands, habitat, scenic, etc.) from hazard minimization decisions, consistent with the Coastal Act.
12. Address the cumulative impacts and regional contexts of planning and permitting decisions.
13. Require mitigation of unavoidable public coastal resource impacts related to permitting and shoreline management decisions.
14. Include best available information on resource valuation in mitigation of coastal resource impacts.

D. Maximize Agency Coordination and Public Participation [Coastal Act Chapter 5; Sections 30006; 30320; 30339; 30500; 30503; 30711]

15. Coordinate planning and regulatory decision making with other appropriate state, local, and federal agencies; support research and monitoring efforts.
16. Consider conducting vulnerability assessments and adaptation planning at the regional level.
17. Provide for maximum public participation in planning and regulatory processes.

GUIDANCE FOR LOCAL COASTAL PROGRAMS

This document provides a step-by-step process for incorporating sea-level rise and adaptation planning into new and amended Local Coastal Programs (LCPs). These steps, summarized below in text and in Figure 1, can be tailored to fit the needs of individual communities and to address the specific coastal resource and development issues of a community, such as dealing with bluff erosion or providing for effective redevelopment, and urban infill and concentration of development in already developed areas. Coastal Commission staff will be available to consult with local government planners during this process.

Step 1. Determine a range of sea-level rise projections relevant to LCP planning area or segment. Local governments should use the best available science—which, as

reported in the State of California Sea Level Rise Guidance Document,[4] is currently the 2012 NRC Report—to identify a range of sea-level rise projections for their region. Next, they should modify those projections to account for local conditions.

Step 2. Identify potential physical sea-level rise impacts in LCP planning area/segment. Using the sea-level rise projections identified in step 1, planners should determine the potential future impacts of sea-level rise hazards, including inundation, storm flooding, wave impacts, erosion, or saltwater intrusion into freshwater resources.

Step 3. Assess potential risks from sea-level rise to coastal resources and development in LCP planning area/segment. Planners should determine what development and resources, including those addressed in Chapter 3 of the Coastal Act, are at risk from sea-level rise hazards. As part of this step, planners should assess whether the planning area or segment land uses are feasible given sea-level rise impacts and determine whether land uses will need to be revised. This process will enable planners to prioritize resources at risk in the next steps of the planning process.

Step 4. Identify adaptation measures and LCP policy options. Certified LCPs will already have land use policies, standards, and ordinances that implement Chapter 3 policies related to hazard avoidance and mitigation; however, these may need to be amended to address sea-level rise impacts. Two types of updates will be necessary to address sea-level rise: policies and ordinances that apply to all development exposed to sea-level rise, and policies and land use changes to address specific risks in a particular portion of the planning area. Chapter 4 and Appendix C of this document outline possible sea-level rise adaptation measures that can be employed at both the community-level and the site-specific level.

Step 5. Develop or update LCP and certify with California Coastal Commission. The next step is to incorporate the LCP policies that address sea-level rise into a new LCP or an updated LCP amendment, and submit the document to the Coastal Commission for certification. Developing or updating the LCP should be completed in close coordination with Coastal Commission staff. Once the LCP, including the Land Use Plan and Implementing Ordinances, are amended and certified with revised policies to address sea-level rise, local governments will implement the certified policies through the coastal development permit process. Local governments should identify technical assistance and pursue funding and partnerships necessary to support this action.

Step 6. Monitor and re-evaluate implementation of the LCP and specific measures as needed. Planners should then identify key resources to monitor and plan periodic updates to their LCPs to incorporate new science relevant to their area.

[4] Available at http://www.opc.ca.gov/2009/12/climate-change/.

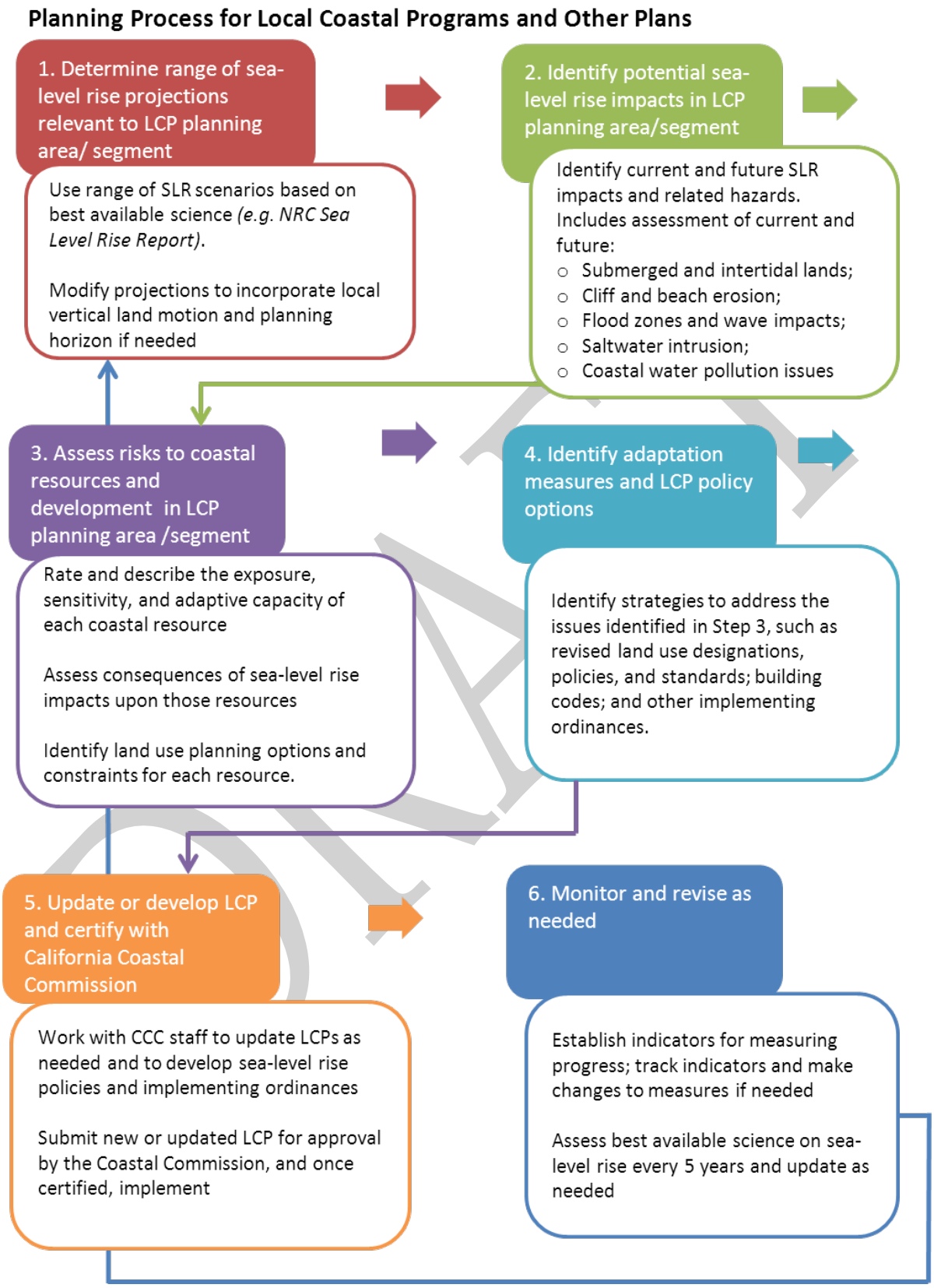

Figure 1. Flowchart for Addressing Sea-Level Rise in Local Coastal Programs and other Plans

GUIDANCE FOR COASTAL DEVELOPMENT PERMITS

New development within the coastal zone generally requires a Coastal Development Permit (CDP). Many projects reviewed through the CDP application process already examine sea-level rise as part of the hazards analysis. This document offers a step-by-step outline of how to conduct such an analysis as a standard part of the CDP application process. The goal of these steps is to ensure careful attention to minimizing risk to development and avoiding impacts to coastal resources over the life of the project. Coastal Commission staff will be available to consult with applicants during this process.

Step 1. Establish the projected sea-level rise range for the proposed project. Applicants should use the best available science—which, as reported in the State of California Sea Level Rise Guidance Document,[5] is currently the 2012 NRC Report—to identify a range of sea-level rise projections for the project's planning horizon, or, alternatively, for the time periods identified in the 2012 NRC report: 2030, 2050, and 2100.

Step 2. Determine how impacts from sea-level rise may constrain the project site. Though LCPs often provide an analysis of sea-level rise hazards, projects within the coastal zone often require a more site-specific analysis of the probable effects of sea-level rise. This analysis should look at how erosion, structural and geologic stability, flooding and inundation, flood elevation, and other impacts may limit where the project can feasibly be sited under the sea-level rise scenarios identified in step 1. Appendix B explains how to incorporate sea-level rise into analyses of changes to the intertidal zone, areas of future erosion, impacts from waves and wave runup, and inclusion of extreme events.

Step 3. Determine how the project may impact coastal resources, considering the influence of future sea-level rise upon the landscape. Coastal resources should then be identified, and feasible and safe project sites should be selected that avoid impacts to those resources. This analysis should include potential impacts of any sea-level rise adaptation strategies that may be used over the lifetime of the project, along with inland/upland requirements for buffers or retreat.

Step 4. Identify alternatives to avoid resource impacts and minimize risks. If there are potential conflicts with coastal resources, the project design should focus on alternatives that will be protective of coastal resources throughout the expected life of the development. The project should avoid sea-level rise hazards if possible, and minimize hazard exposure if avoidance is infeasible. If it is not feasible to site or design a structure to be safe from sea-level rise over the anticipated life of the structure, the applicant should develop a sea-level rise adaptation strategy, including steps to relocate or modify the development as needed to prevent risks to the development or to coastal resources as part of the alternatives analysis. The CDP

[5] Available at http://www.opc.ca.gov/2009/12/climate-change/.

should also identify any design constraints that would prevent the implementation of any of those adaptation measures. New development should not in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs.

Step 5. Finalize project design and submit CDP. The applicant should work with the planning staff to complete the CDP application and develop a project that is consistent with the Coastal Act, protective of coastal resources, and minimizes risks from sea-level rise to the greatest extent feasible.

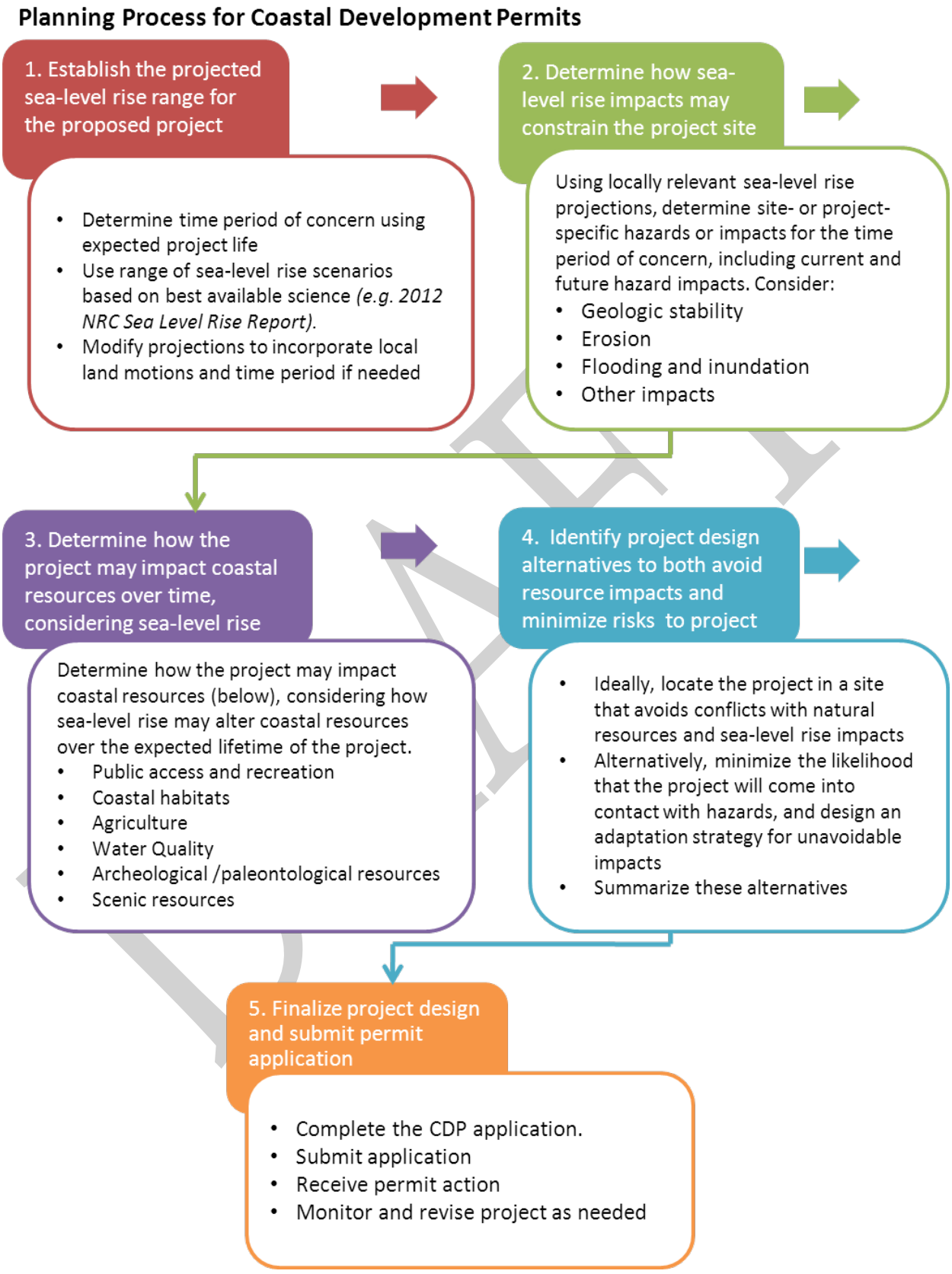

Figure 2. Flowchart for Addressing Sea-Level Rise in Coastal Development Permit

ADDITIONAL INFORMATION

In summary, this guidance provides step-by-step approaches for addressing sea-level rise in LCPs and CDPs. It also offers extensive Appendices with supplemental information, including:

- Detailed information on the drivers of sea-level rise and sea-level rise projections
- A step-by-step methodology for developing local hazard conditions based on regional sea-level rise projections, which is applicable to both LCPs and CDPs
- Descriptions of many sea-level rise adaptation measures
- Lists of other useful resources and references
- Examples of sea-level rise adaptation documents from other state agencies
- Descriptions of specific Coastal Act policies relevant to sea-level rise and coastal hazards

CONTEXT OF THIS DOCUMENT

Commission staff recognizes that this guidance is part of a larger body of work on climate change by State agencies, regional collaborations, local leadership, academic research and other organizations. Many of these efforts are included as resources in Appendix D and Appendix E. Staff encourages users of the document to take advantage of existing resources, collaborate with others, and share best practices as much as possible.

Finally, this document is intended to function as guidance, not regulations. It does not govern the planning and regulatory actions that the Commission or local governments may take under the Coastal Act and subject to the applicable requirements of the Coastal Act, the Coastal Zone Management Act, certified LCPs and other applicable laws and regulations as applied in the context of the evidence in the record for that action.